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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
TANG, KUO LIANG J	

ART UNIT	PAPER NUMBER
2122	

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,162	CHILIMBI, TRISHUL M.	
	Examiner	Art Unit	
	Kuo-Liang J Tang	2122	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the amendment filed on 7/8/2004.

The priority date for this application is 10/17/2000.

Claims 1-26 are pending and have been examined. Claims 1, 13 and 20 are amended.

Claims 1-3 and 11-13, 15-16 and 20-26 remain rejected under 35 U.S.C. 102(b) as being anticipated by Larus.

Claims 4-9, 14 and 17-19 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of Minard.

Claim 10 remains rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of Minard, further in view of Srivastava.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 and 11-13, 15-16 and 20-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Larus, "Whole Program Paths", ACM SIGPLAN NOTICES, Vol. 34, No. 5, Atlanta, GA, May 1999, pp. 259-269 (art of Record).

As Per Claim 1, Larus teaches that whole program paths (WPP) are a new approach to capturing and representing a program's dynamic --actually executed—

control flow. (E.g. see Abstract and associated text). In that Larus discloses a method that covering the steps of:

"identifying repetitively occurring data access sequences in a stream of data access references;" (E.g. see pg. 259, line 19-30, which states "... identifies heavily executed (hot) subpaths ...", Figure 1 and associated text); and

"displaying a plurality of identifiers, wherein each identifier is associated with one of the data access sequences;" (E.g. see pg. 260, right col. line 1-2, path identifiers; Figure 2 and associated text);

"upon selection of one of the plurality of identifiers, identifying code related to the data access sequence associated with the selected identifier." (E.g. see Section 2 on page 260, Figure 2, Code and Acylic Path Trace for identifier and associated text).

"generating a stream flow output that displays the occurrences of repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... hot subpaths (ab and bc)") in the stream of data access references (E.g. see Figure 5 and associated text) while ignoring non-repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... bb and ca ...")". The examiner interprets the non-hot subpaths (bb and ca) are the non- repetitively occurring data access sequences and the hot subpaths (ab and bc) are the repetitively occurring data access sequences in Figure 5. Therefore, the non-hotspaths are ignored (i.e. bb, ca), and only two hotsubpaths (i.e. ab, bc) are left (from ab, bc, bb, ca).

As per Claim 2, the rejection of claim 1 is incorporated and further Larus teaches

"constructing a grammar from the stream of data access references;" (E.g. see Figure 2, SEQUITUR Grammar and associated text).

"building a candidate sequence using the grammar;" (E.g. see Figure 2, symbols S, A, B, C and associated text); and

"if a cost (E.g. see page 263, Section 4.2, 2nd paragraph, subpath's cost) of accessing data in the candidate sequence exceeds a threshold, marking the candidate sequence as a repetitively occurring data access sequence." (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 3, the rejection of claim 2 is incorporated and further Larus teaches

"computing the cost comprises multiplying a number of times the candidate sequence occurs in the grammar by a number of data access references in the candidate sequence." (E.g. see page 263, Section 4.2, 2nd paragraph, subpath's cost).

As per Claim 11, the rejection of claim 1 is incorporated and further Larus teaches

"the code (E.g. see page 260, Figure 2, code and associated text), when previously executed, referenced data in the data access sequence associated with the selected identifier (E.g. see page 263, Figure 5, and associated text).".

As per Claim 12, the rejection of claim 1 is incorporated and further Larus teaches

"the stream of data access references is included in a trace file." (E.g. see page 260, Section 2, 1st paragraph, acyclic path trace).

As Per Claim 13, Larus teaches a system for developing computer-executable software, comprising:

"an instrumentation tool configured to instrument a software program to produce a trace when the software program is executed;" (E.g. see page 260, Section 2, 1st paragraph, acyclic path trace);

"a trace analyzer confgured to receive the trace and identify repetitively occurring data access sequences;" (E.g. see page 260, Section 2, Figure 2, and associated text and page 265, right column, line 7-14, PPCompress);

"a stream flow detector that is configured to generate a stream flow output that displays the occurrences of repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... hot subpaths (ab and bc)") in the stream of data access references (E.g. see Figure 5 and associated text) while ignoring non-repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... bb and ca ...")". (The examiner interprets the non-hot subpaths (bb and ca) are the non- repetitively occurring data access sequences and the hot subpaths (ab and bc) are the repetitively occurring data access sequences in Figure 5. Therefore, the non-hotspaths are ignored (i.e. bb, ca), and only two hotsubpaths (i.e. ab, bc) are left (from ab, bc, bb, ca)) and

"a software development tool configured to use the identified data access sequences and stream flow output (E.g. see Figure 5 and associated text) in software development." (E.g. see page 265, right column, lines 7-14, Microsoft's Vulcan tool.).

As per Claim 15, the rejection of claim 13 is incorporated and further Larus teaches the trace analyzer identifies repetitively occurring data access sequences by performing steps, comprising:

"constructing a directed acyclic graph (DAG) from the data accesses of the trace file;" (E.g. see page 262, Figure 4. and associated text; and section 3.3 2nd paragraph, DAG);

"building a candidate sequence using the DAG;" (E.g. see page 262, Figure 4. and associated text); and

"if a cost of accessing data in the candidate sequence exceeds a threshold, marking the candidate sequence as a repetitively occurring data access sequence.". (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 16, the rejection of claim 15 is incorporated and further Larus teaches

"computing the cost comprises multiplying a number of times the candidate sequence is generated using the DAG by a number of data access references in the candidate sequence." (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 20, is the computer-readable medium (E.g. see Abstract) claim and further Larus teaches

"displaying a plurality of identifiers, wherein each identifier is associated with one of the data access sequences;" (E.g. see pg. 260, right col. line 1-2, path identifiers; Figure 2, and associated text);

"upon selection of one of the plurality of identifiers, identifying code related to the data access sequence associated with the selected identifier." (E.g. see Figure 2, Code and Acylic Path Trace for identifier and associated text) and

"generating a stream flow output that displays the occurrences of repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... hot subpaths (ab and bc)") in the stream of data access references (E.g. see Figure 5 and associated text) while ignoring non-repetitively occurring data access sequences (E.g. see Figure 5 and associated text, i.e. see page 264, left col. Lines 5-7, which states "... bb and ca ...")". The examiner interprets the non-hot subpaths (bb and ca) are the non- repetitively occurring data access sequences and the hot subpaths (ab and bc) are the repetitively occurring data access sequences in Figure 5. Therefore, the non-hotspaths are ignored (i.e. bb, ca), and only two hotsubpaths (i.e. ab, bc) are left (from ab, bc, bb, ca).

As per Claim 21, the rejection of claim 20 is incorporated and further Larus teaches

"attribute comprises the number of times the associated data access sequence repeats in the stream." (E.g. see Figure 5 and associated text; and page 263, left column, lines 11-22, execution frequency).

As per Claim 22, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises the number of data references in the associated data access sequence." (E.g. see Figure 4, string 121213121214; Figure 5 and associated text).

As per Claim 23, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises a number of unique objects referenced in the associated data access sequence." (E.g. see Figure 5, symbols S, A, B C and associated text).

As per Claim 24, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises a number of references in the stream between occurrences of the data access sequence." (E.g. see Figure 5-6, and associated text).

As per Claim 25, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute shows an efficiency with which the references of a data access sequence are placed in cache blocks." (E.g. see page 263, left column, last paragraph, context-sensitive metrics).

As per Claim 26, the rejection of claim 25 is incorporated and further Larus teaches "context-sensitive metrics". (E.g. see page 263, left column, last paragraph,

context-sensitive metrics). Larus does not explicitly disclose efficiency is calculated by dividing a minimum number of cache blocks in which references of the data access sequence could be placed by an actual number of cache blocks in which references in the data access sequence are placed. However, larus discloses Ammons et al., "Exploiting Hardware Performance Counters with Flow and Context Sensitive Profiling" (E.g. see page 263, left column, last paragraph, context-sensitive metrics). Therefore, cache misses must be in there otherwise, the number of caches misses in a particular execution, cannot be captured in a WPP. Hence, efficiency is inherent because it refers to anything else but cache miss (1 – (ratio of cache miss)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 4-9, 14 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of Minard, US Patent No. 6,247,020.

As per Claim 4, the rejection of claim 1 is incorporated and further Larus does not explicitly disclose list of identifiers displayed. However, Minard teaches "the list of identifiers is displayed in a software development tool." that lets the user explore, edit design and debug all in one unified window (E.g. see col. 8:41-43, FIG. 4A, Structure pane 430 and associated text). Therefore, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to display a list of identifiers in a software development tool. The modification would have been obvious because one of ordinary skill in the art would have been motivated to let the user explore, edit design and debug all in one unified window.

As per Claim 5, the rejection of claim 4 is incorporated and further Larus does not explicitly disclose a visual development environment. However, Minard teaches "the software development tool is a visual development environment." (E.g. see FIG. 3 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to run the software in a visual development environment. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 6, the rejection of claim 4 is incorporated and further Larus does not explicitly disclose the selection is received from a user input device. Minard teaches "the selection is received from a user input device." (E.g. see FIG. 1B, pointing device 105 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to have the selection is received from a user input device. The modification would have been obvious because one of ordinary skill in the art would

have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 7, the rejection of claim 1 is incorporated and further Larus does not explicitly disclose a navigation pane. However, Minard teaches "displaying a navigation pane (E.g. see FIG. 4A, navigation pane 410 and associated text) that displays the list of identifiers and navigates the list in response to user input.". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to provide a navigation pane. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 8, the rejection of claim 1 is incorporated and further Larus discloses code (E.g. see page 260, Figure 2, Code). Larus does not explicitly disclose the code is displayed and highlighted. However, Minard teaches "the code is displayed and highlighted" (E.g. see col. 11:28-45 and FIG. 4B and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to display and highlight code. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to easily identify where the corresponding code is located to debug the program.

As per Claim 9, the rejection of claim 8 is incorporated and further Larus discloses source code (E.g. see page 260, Figure 2, Code).

As per Claim 14, the rejection of claim 13 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 5.

As per Claim 17, the rejection of claim 13 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 7.

As per Claim 18, the rejection of claim 17 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 7.

As per Claim 19, the rejection of claim 18 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 7.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of Minard, further in view of Srivastava et al., "Vulcan: Binary transformation in a distributed environment", Microsoft Research Technical Report MSR-TR-99-76 (replaced by MSR-TR-2001-50), 1999 (hereinafter Srivastava).

As per Claim 10, the rejection of claim 8 is incorporated and further Larus and Minard do not explicitly disclose assembly code. However, Srivastava provides means

for both static and dynamic code modification and provides a framework for cross-component analysis and optimization and teaches "assembly code" (E.g. see Figure 5 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Srivastava into the system of Larus and Minard, to include assembly code. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide variety of code formats for developer to debug and/or test program.

Response to Arguments

5. Applicant's arguments with respect to claims 1-26 have been considered but they are not persuasive.

In the remarks, the applicant argues that:

Applicant primarily argues that Larus does not disclose "generating a stream flow output that displays the occurrences of repetitively occurring data access sequences in the stream of data access references while ignoring non-repetitively occurring data access sequences".

Examiner's response:

Examiner disagrees with applicant's assertion that Larus does not disclose generating the claimed stream flow output display. In fact, Larus does teach the claimed stream flow output display (e.g. see Figure 5, path ad, bc, bb and ca) as applied above.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuo-Liang J Tang whose telephone number is 703-305-4866. The examiner can normally be reached on 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam can be reached on 703-305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

After October 25, 2004, examiner can be reached at new telephone number (571) 272-3705, and the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kuo-Liang J. Tang

Software Engineer Patent Examiner

TUAN DAM
SUPERVISORY PATENT EXAMINER